

STUDY ON THE COUPLED AND COORDINATED DEVELOPMENT OF VILLAGE CULTURAL INDUSTRY AND ECOLOGICAL ENVIRONMENT IN THE CONTEXT OF RURAL REVITALIZATION

Haiyan Gu*

Arts College, Shandong University. Weihai, Weihai, Shandong, 264209, China.

hy-61@163.com

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ABSTRACT

The development and transformation of the ecological environment is an important content and future indicator of global environmental change. At the same time, people of all countries are affected by comprehensive human factors such as local and local cultural industries and humanistic thoughts while jointly protecting the environment. This paper studies the coupling relationship between the development of village cultural industry and ecological environment changes and comprehensively considers the aspects of detecting regional ecological environment changes, optimizing cultural industry facilities, coordinating regional sustainable development, and constructing regional ecological security patterns in the context of rural revitalization. The results showed that the vegetation or forest coverage increased by 9.2%, 17.4%, 28.1% and 30.5% respectively under the cultural industry protection levels of 2-5. The air pollution index decreased by 11.2%, 17.9%, 25.2% and 30.3% respectively, and the pollution of river water resources decreased by 4.1%, 6.6%, 8.9% and 11.1% respectively. The comprehensive ecological environment development index increased by 9.43%, 17.41%, 28.59%, 30.48%, 31.61%, 33.22%, 34.80%, 35.71% and 36.27% respectively under the cultural industry development level of 2-10. Overall, the cultural relics protection strategy of the village cultural industry under the background of rural revitalization has significantly promoted the comprehensive ecological environment in the entire planned area.

KEYWORDS

rural revitalization; cultural industry development; ecological environment; coupling structure; comprehensive development.

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1. INTRODUCTION

Rural revitalization is the basic project of a country's modernization [1,2]. For China, rural issues are even more fundamental to development [3,4]. Ensuring food security, narrowing the gap between the rich and the poor, protecting the ecological environment, enhancing cultural confidence, and promoting sustainable and stable economic growth [5,6] are all inseparable from rural revitalization. Rural revitalization mainly includes the following aspects, as shown in Table 1: it mainly includes talent revitalization [7], cultural industry revitalization [8], and ecological environment revitalization [9]. The development of rural revitalization cannot be separated from innovation, and innovation cannot be supported by talent [10]. Village culture is a valuable treasure of Chinese culture. It is an important part of the development history of Chinese culture and an important soft power for China [11,12]. A good ecological environment has a positive effect on human development. A place of water and soil nurtures a person, and the temperament of nature and human temperament often have the characteristic of mutual nurturing. A good ecological environment inevitably contributes to the formation of a good human temperament [13]. Protecting the ecological environment is equal to protecting the resources that can be used in the future [14], which is conducive to the sustainable development of national resources. Most importantly, in carrying out rural revitalization, we must adhere to the priority development of agriculture and rural areas. According to the general requirements of prosperous industry, ecological livability, civilized countryside, effective governance, and affluent living, we will accelerate the modernization of agriculture and rural areas. The key and focus of rural revitalization is industrial revitalization. Only when the rural industry is revitalized can more jobs and positions be created, and a sustainable and stable channel for farmers to increase their income and rural affluence can be developed. The cultural industry is an important part of rural revitalization. It is very meaningful to realize the coupled and coordinated development of village cultural industry and ecological environment for rural revitalization.

Table 1. Main contents of rural revitalization

Content	Features
Talent Revitalization	Talent is the basic driving force of rural revitalization development
Cultural Industry Revitalization	Cultural dynamics is the deep and lasting power of rural revitalization
Ecological revitalization	Focus on regional characteristics, respect local ecological differences, reflect the diversity of characteristics

For the present, studies on the culture of village industry related to the ecological environment have also received much attention. Village revitalization is an inevitable requirement for China to achieve the great rejuvenation of the Chinese nation. Zhang, T. [15] analyzed the characteristic village revitalization in the context of China's rural revitalization strategy with historical and cultural accumulation, climatic characteristics and residential lifestyle [16]. Their improved vernacular residential model has better regional adaptability and echoes the local living culture and habits. Further, the study

not only has a positive effect on the preservation of local architectural culture but also plays a crucial role in improving the living standard of residents. Huang, Y. [17] started their study from within the village to reveal the rural transformation process in placemaking theory from a micro perspective. Their research shows that the relationship between people and land can be reconciled in the process of place-making. Yang, S.X. [18] applied technology analysis to update China's understanding of the site and the technological [19,20] economic behavior of the cultural industry in the Loess Plateau region. Ye, C. [21] presented the spatial production of rural culture in three dimensions: ideational space, superficial space, and daily life space based on the theory of spatial production, and analyzed the rural culture. The reasons for the gradual decline of rural culture. Culture is the root of rural development. A lost culture leads to a lost village. They argue that adequate daily living space is important for the flourishing of rural culture. In a study by Chen, Z. [22], they proposed cultural heritage as a resource for development in many rural areas in China. They collected data through participant observation [23,24] as well as conducting a series of unstructured and semi-structured interviews. Arguing how cultural heritage as rural economic development involves the entanglement and interplay of various powers, Wodarczyk-Marciniak, R. argued [25] that current patterns of agricultural intensification pose a threat to traditional agricultural landscapes through landscape simplification [26] and lead to the loss of biodiversity, ecological functions and key ecosystem services in rural areas [27]. Therefore, in rural revitalization, more attention needs to be paid to ecological protection. Jiang, Y. [28] first explored the theoretical and practical model of land remediation for rural development from the perspective of multifunctional land use [29] and explored its intrinsic mechanism. They argued that land remediation contributes to rural development by changing the type and intensity of rural land use functions and by studying the industrial structure, ecological environment, and cultural construction. The ecological approach to agriculture has received increasing attention in rural development, and the ecological approach has been demonstrated mainly in the multifunctionality discourse [30]. Xie, J. [31] showed that soil degradation and water pollution associated with excessive use of chemical fertilizers, pesticides and agricultural films lead to serious ecological problems. Duan, Y. [32] concluded that accurate identification of the rural "production-life-ecology" space is important for optimizing rural space in China. They based their research on participatory mapping, semi-structured interviews, and spatial analysis techniques to promote rural ecological protection and economic development. We have synthesized the studies of scholars related to village industrial development and the ecological environment. We find that for village revitalization, the development of the village industry is one of the important links. Culture is the root of rural development and culture is the soul of villages. By promoting the development of cultural industries in rural villages and forming cultural industries with various characteristics, we can provide lasting power to rural revitalization. In addition, we need both rural revitalization and a good living and living environment. Rural revitalization cannot be done at the cost of the ecological environment.

Achieving rural revitalization is a great initiative that has never been done before or since. The revitalization of the countryside encompasses all aspects. For cultural revitalization, the countryside in China has created a glorious farming civilization, and the excellent traditional culture accumulated in history relies on the maintenance and

inheritance of the rural society. For ecological revitalization, the environment is the foundation on which our survival depends. However, in previous research work, they often isolated the cultural industry revitalization of rural villages from the ecological environment for research. Therefore, in our research, we coupled the village cultural industry with the ecological environment. We fully consider the revitalization of the cultural industry while taking into account the revitalization of the ecological environment, and explore the way of coordinated development of the cultural industry and ecological environment.

2. CURRENT SITUATION OF THE VILLAGE CULTURE INDUSTRY UNDER THE STRATEGY OF RURAL REVITALIZATION

2.1. ENCOURAGE VILLAGE ABORIGINES TO PARTICIPATE IN THE TRANSMISSION OF VILLAGE CULTURAL INDUSTRIES

To further strengthen the promotion of the training program for the indigenous people of traditional village culture industry, it is necessary to educate a lot of ideas and cultivate generations of indigenous people who are interested in traditional village culture industry, are inculcated by traditional village culture industry, and strengthen the inheritance and maintenance of traditional village culture industry, to stimulate the initiative of the indigenous people of traditional village culture industry to inherit traditional village culture industry and call for the indigenous people of traditional village culture industry to pursue traditional village culture industry, as shown in Figure 1.

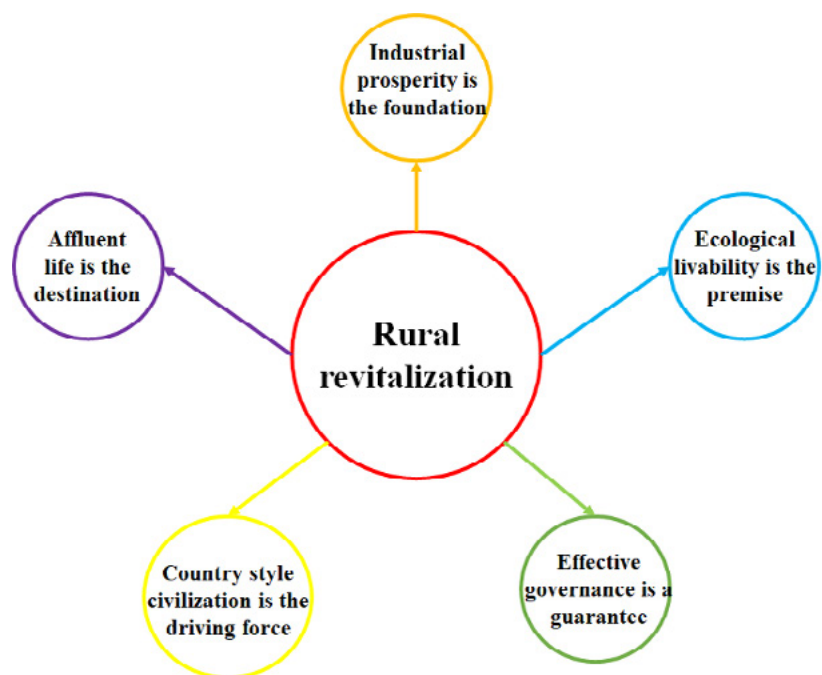


Figure 1. Village cultural industry and ecological environment coupled and coordinated development map

In addition, through a large number of media to promote the traditional village cultural industry, to mobilize the traditional village cultural industry aborigines to the traditional village cultural industry. This further promotes the vast number of indigenous people of the traditional village culture industry to join the great cause of inheriting and maintaining the traditional village culture industry. In the process of promoting the traditional village culture industry, we deeply strengthen the impression of excellent village traditional culture industry to the aborigines of traditional village culture industry. We internalize the excellent village traditional culture industry in the hearts of the indigenous people of the traditional village culture industry by making the excellent village traditional culture industry. In this way, we can make the excellent village traditional cultural industry outwardly visible in the behavior of the indigenous people of the traditional village cultural industry, and strengthen the inheritance and maintenance of the traditional village cultural industry.

Finally, it is the social elites coming out of the villages that are the main support for realizing the traditional village cultural industry; they have a large amount of social resources and have a unique understanding of the traditional village cultural industry. Therefore, we can make use of the advantages of village elite talents to make reasonable planning for traditional village cultural industry resources, plan parallel development paths of inheritance, protection, development and utilization, and vigorously promote the sustainable development of traditional village cultural industry. With the construction of roads and traffic, industrial upgrading and old village renovation, traditional villages will not only undergo a radical change in their environment but will also inevitably attract a large number of high-quality talents and contribute to the enhancement of the land value of the area.

2.2. THE MARKET DRIVES THE HERITAGE OF THE VILLAGE CULTURE INDUSTRY

It is worth mentioning that traditional villages are rich in characteristic food, manufacturing, handicraft and other vernacular industrial resources, and the innovative development of the village handicraft industry is an important force to realize the revitalization of traditional villages. The social market is the main core of the traditional village cultural industry, which plays an important role as a bridge between the city and the traditional village cultural industry, and between consumers and the indigenous people of the traditional village cultural industry, and also has the irreplaceable position of the unified village cultural industry to realize the inheritance and innovation of the traditional village culture. Therefore, the market should characterize the ecological environment, historical relics, traditional agriculture, handicraft, folk culture and other resource endowments of traditional villages. Further, the market allows the indigenous people of the cultural industry of traditional villages to obtain higher economic returns through this, giving rise to a strong endogenous impetus for the protection of traditional villages. Adapting to the new changes of diversified market demands, we create new types of agriculture such as ecological agriculture, scientific and technological agriculture, creative agriculture and leisure and health agriculture. Thus, we can promote the transformation of agriculture in

traditional villages from a single production-oriented business to a new market-oriented business with diversified and integrated development.

2.3. THE GOVERNMENT DOES A GOOD JOB OF GUARANTEEING THE CULTURAL INDUSTRY

Emphasize and strengthen the leading role of government departments, promote the construction of relevant policies and laws and regulations, provide strong political guarantees for the inheritance of traditional village culture, and ensure the stability, effectiveness and long-term nature of cultural inheritance work. Second, promote the construction of the village culture heritage development system. Good project off, in conjunction with the District Party Committee Propaganda Department, District Justice Bureau, and District Culture and Tourism Bureau together on the project selection process and conditions, the use of the fund's management agreement signed and other aspects of the gatekeeper. To keep the funds, the proposed support projects for financial settlement evaluation, according to the evaluation amount by the principles of support determine the support funds. At the same time, the government should also accelerate the standardization and equalization of basic public cultural services to achieve the goal.

2.4. ECOLOGICAL ENVIRONMENT QUALITY EVALUATION

Eco-environmental quality is a comprehensive concept that is put forward after a series of eco-environmental problems have occurred in natural factors or human production and living activities. It is used to measure the scope, degree, advantages and disadvantages of human activities in the ecological environment.

2.4.1. GREENNESS INDEX

Normalized vegetation index (*NDVI*) is one of the most widely used indexes in multi vegetation index. It is widely used in analyzing crop growth, vegetation coverage and spatial distribution.

$$NDVI = \frac{(\rho_4 - \rho_3)}{(\rho_4 + \rho_3)} \quad (1)$$

Among them, ρ_4 and ρ_3 represent the reflectance of the near-infrared band and visible red band respectively. *NDVI* value represents the vegetation status of the basin. The larger the normalized *NDVI* value is, the higher the vegetation coverage is.

2.4.2. HUMIDITY INDEX

The humidity component is widely used in ecological environment monitoring, which can not only represent the water resource status of regional rivers and

reservoirs but also calculate the humidity of land use types such as cultivated land and forest land.

$$Wet = 0.0315\rho_1 + 0.2021\rho_2 + 0.3102\rho_3 + 0.1594\rho_4 - 0.6806\rho_5 - 0.6109\rho_7 \quad (2)$$

Among them, ρ_i is the reflectivity of TM bands. After normalization, the higher the wet value, the greater the humidity.

2.5. COUPLED EVALUATION MODEL

2.5.1. DEVELOPMENT DEGREE(T)

The material culture protection assessment is composed of the number of cultural relics protected items, the degree of restoration, and the completeness of cultural relics background knowledge, which can be established as follows:

$$A = w_1B + w_2C + w_3D \quad (3)$$

Where A is the material culture protection assessment, B is the degree of restoration and D is the completeness of cultural relics background knowledge. w_1 , w_2 and w_3 are the weights for each variable are equal to 0.4, 0.4 and 0.2, respectively.

Development degree refers to the comprehensive development level of economic development and ecological environmental protection, reflecting the overall benefits of both. The expression of its function is as follows.

$$T = af(x) + bg(y) \quad (4)$$

Where a and b denote the weights of economic development and ecological environmental protection indicators respectively. $f(x)$ and $g(y)$ denote the economic quality index and ecological environmental protection index respectively.

2.5.2. COUPLING DEGREE (C).

The coupling degree can measure the coupling development degree of economic development and ecological environmental protection, and its function is as follows.

$$C = 2\sqrt{\frac{(f(x) \cdot g(y))/(f(x) + g(y))^2}{(f(x) + g(y))^2}} \quad (5)$$

Where a larger value of C indicates that the two are more coupled.

2.5.3. DEGREE OF COORDINATION (D).

The coordination degree integrates the development degree and coupling degree, which is characterized by high stability and can be used to measure the coordinated development of the research object.

$$D = \sqrt{C \cdot T} \quad (6)$$

3. THE CURRENT SITUATION OF THE ECOLOGICAL ENVIRONMENT UNDER THE STRATEGY OF RURAL REVITALIZATION

Rural ecological environment governance and the implementation of the rural revitalization strategy promote each other. Rural ecological environment governance is not only an important way to implement the rural revitalization strategy but also its due meaning. The relationship between the two is mutually reinforcing and can also produce a positive multiplier effect. Promote rural ecological revitalization, and build beautiful villages with clean and beautiful living environments, stable and healthy ecosystems, and harmonious coexistence between humans and nature. In addition, farmers' weak awareness of environmental protection and the limited ability of NGOs to participate in governance cannot be ignored. To promote the governance of the rural ecological environment and realize the comprehensive revitalization of the rural society, there is an urgent need for "stakeholders" such as local enterprises, farmers, NGOs, and rural communities to perform their respective functions under the leadership of the local government, and "multiple governances". Among them, the local government should take the responsibility of "leading"; local enterprises should strengthen the social responsibility of protecting the rural ecological environment; farmers should enhance their awareness of the main body of governance; NGOs should improve their ability to participate in the governance of rural ecological environment; The "main position" of ecological environment governance. Rural communities should give full play to the "home field" advantage of ecological environment governance.

4. ANALYSIS AND DISCUSSION

In recent years, more and more attention has been paid to the ecological environment, which is in line with the intent of the Paris Agreement, the global climate and carbon emissions, and other environmental factors. The development and transformation of the ecological environment is therefore an important element of global environmental change and an indicator of the future. At the same time, the common protection of the environment by all peoples is influenced by a combination of human factors such as local and local cultural industries and humanistic thinking. Local cultural industries are inextricably linked to the sustainable development of the environment and ecology and the further rational development of agricultural land and the increase of construction land for better social and economic development. Therefore, by using the active promotion of humanistic village cultural industries and

the active control of environmental ecology, we can further realize the coupled development under rural revitalization. At the same time, the passive properties of the above two main factors confer a passive gain effect in the regulation, which is expected to make the future integrated development a positive cycle in nature. A large number of previous studies have been conducted on different scales and contexts. The results show that there is a complex dynamic coupling relationship between the two, that changes in land use and ecological service values are bound to bring about changes in one or the other, and that the village cultural industry is one of the important drivers of ecological change, and that the transformation of the village cultural industry leads to changes in its service values by changing the structure and function of the ecosystem. Therefore, studying the coupling relationship between cultural industry transformation and ecological environment change in villages is of considerable critical practical significance for detecting regional ecological environment change, optimizing cultural industry facilities, coordinating regional sustainable development and constructing regional ecological security patterns in the context of rural revitalization.

And the cultural revitalization in the rural revitalization strategy has created positive and remarkable innovations in China's rural construction. The excellent traditional culture accumulated in history relies on the maintenance and transmission of rural society. For ecological revitalization, the environment is the basis on which we live. However, in previous research work, they often studied the revitalization of rural village cultural industries in isolation from the ecological environment. Therefore, in our study, we coupled the cultural industry and ecological environment of villages together. We fully consider the revitalization of the cultural industry while taking into account the revitalization of the ecological environment, and explore the way of coordinated development of the cultural industry and ecological environment.

4.1. THE IMPACT OF CULTURAL CONSERVATION ON THE ECOLOGICAL ENVIRONMENT

First, we considered the important and significant change variables in the development of village cultural industry in the context of rural revitalization. We selected two major regions of Ganzi and Aba in Sichuan Province for a specific analysis related to the coupled development relationship between the village cultural industry and the ecological environment. The variables involved in the analysis are the combined effects of material and non-material cultural conservation on the comprehensive ecological environment evaluation index. Among them, the material culture protection assessment is composed of the number of cultural relics protected items, the degree of restoration and the completeness of cultural relics background knowledge are calculated by weights, and the weights are 0.4, 0.4 and 0.2 respectively. Similarly, the assessment of intangible cultural protection is composed of the frequency of holding cultural evenings, the number of Internet APP broadcasts, and the integrity of the cultural network. The weights are 0.4, 0.2, and 0.4, respectively. As for the comprehensive index of ecological environment, we considered the vegetation coverage rate of the area near the cultural industry of each village, the pollution degree of water resources of rivers and the air pollution index.

For the comprehensive index of the ecological environment, we considered comprehensive factors such as the vegetation coverage rate in the vicinity of each village's cultural industry, the pollution degree of river water resources, and the air pollution index. The way to obtain these parameters comes from the statistics of government platforms in Sichuan Province from 2018 to 2020. The results are shown in Figure 2. It is observed that the vegetation coverage rate of the comprehensive evaluation index of the ecological environment increases with the increase of the protection degree of cultural relics, while the pollution degree of river water resources and the air pollution index decrease with the increase of the protection degree of cultural relics. In general, the ecological environment in the vicinity of the village cultural heritage sites increased significantly with the increase in the level of protection of cultural heritage in the village cultural industry. Specifically, the vegetation or forest cover of the surrounding areas increased by 9.2%, 17.4%, 28.1%, and 30.5%, respectively, under the cultural industry protection level of 2, 3, 4, and 5, compared to the cultural industry protection level of 1, with an average rate of increase of about 10% with the cultural industry protection level. At the same time, the air pollution index decreased by 11.2%, 17.9%, 25.2% and 30.3% under the cultural industry protection level of 2, 3, 4 and 5, respectively, with an average reduction rate of about 8% with the cultural industry protection level. In addition, the pollution level of river water resources decreases by 4.1%, 6.6%, 8.9% and 11.1% under the cultural industry protection level of 2, 3, 4 and 5, respectively, with an average reduction rate of about 3% with the cultural industry protection level. The results of the integrated environmental index with the degree of cultural protection are shown in Figure 3, where it is observed that the integrated ecological index increases by 17.32%, 24.27%, 29.99%, and 32.44% under the overall cultural industry protection degree of rank 2, 3, 4, and 5, respectively.

The overall situation shows that the local government and related organizations attach importance to tangible and intangible cultural heritage as well as policy implementation is reflected, which is reflected at a deeper level in the coupled development relationship with the ecological environment. The heritage conservation strategy of the village cultural industry in the context of rural revitalization has significantly promoted the comprehensive ecological environment in the whole plan area.

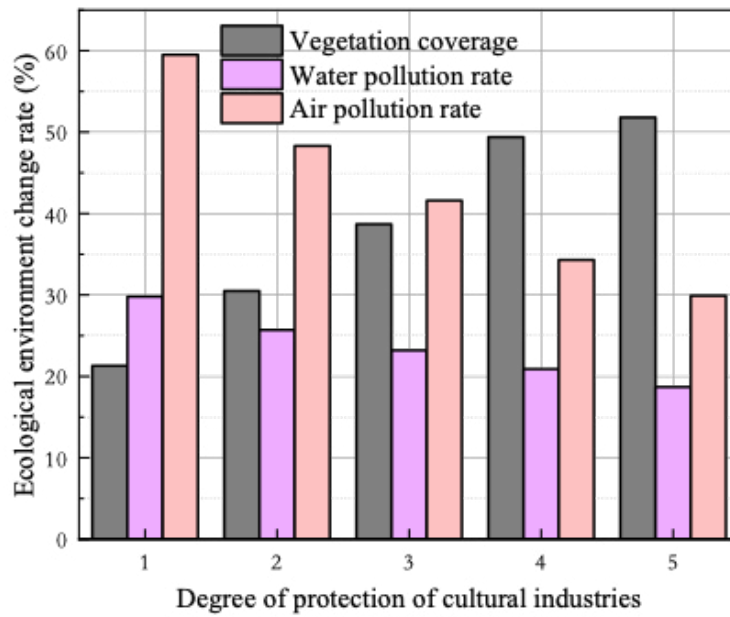


Figure 2. Variation of each ecological index with the degree of cultural protection

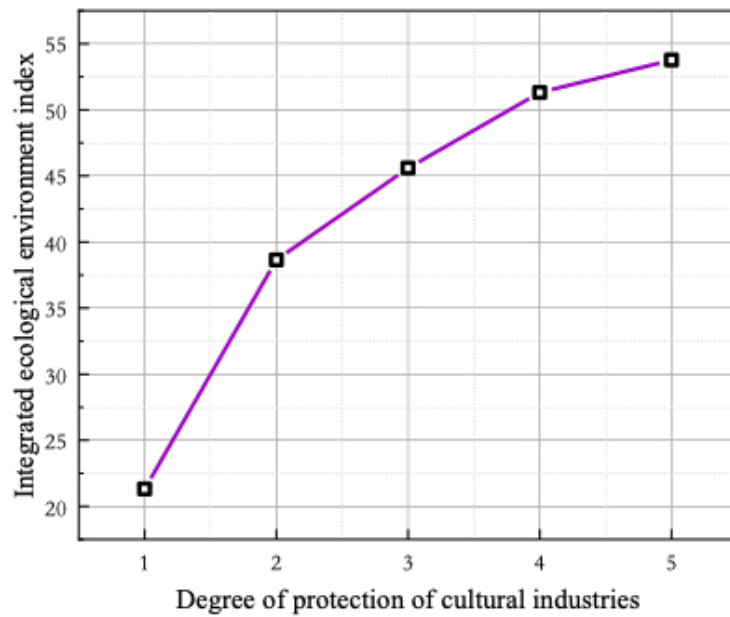


Figure 3. Variation of integrated ecological environment indicators with the degree of cultural protection

4.2. THE RELATIONSHIP BETWEEN CULTURAL INDUSTRY DEVELOPMENT AND THE ECOLOGICAL ENVIRONMENT

Subsequently, we conducted a comprehensive assessment of the coupled development relationship between the development of cultural industry and the ecological environment in villages in the context of rural revitalization. Among them, we selected the cultural industry development levels (0-10) of different villages in two major regions of Ganzi and Aba in Sichuan Province as the independent variables, while the integrated development index of the ecological environment on the horizontal axis was used as the dependent variable. The development trend is shown in Figure 4, where it is observed that the comprehensive eco-environmental development index increases with the degree of cultural industry development. Specifically, relative to the degree of cultural industry development at rank 1, the eco-environmental comprehensive development index changes significantly at the degree of cultural industry development at ranks 2, 3, 4, 5, 6, 7, 8, 9, and 10. They improved accordingly by 9.43%, 17.41%, 28.59%, 30.48%, 31.61%, 33.22%, 34.80%, 35.71%, and 36.27%. The improvement of the overall eco-environmental composite development index obtained a greater increase at the lower level of cultural industry development, with an average increase of about 9%. After the development level of the cultural industry reaches 4, the increase of the overall ecological environment comprehensive development index gradually slows down, which means that the cultural industry needs more to maintain a good ecological environment after taking shape, which is more conducive to sustainable development. Therefore, when the development degree of cultural industry in a certain region reaches a certain level, the relevant government and enterprises can appropriately develop more other fields, which means that the coupling degree of cultural industry development and ecological environment is reduced.

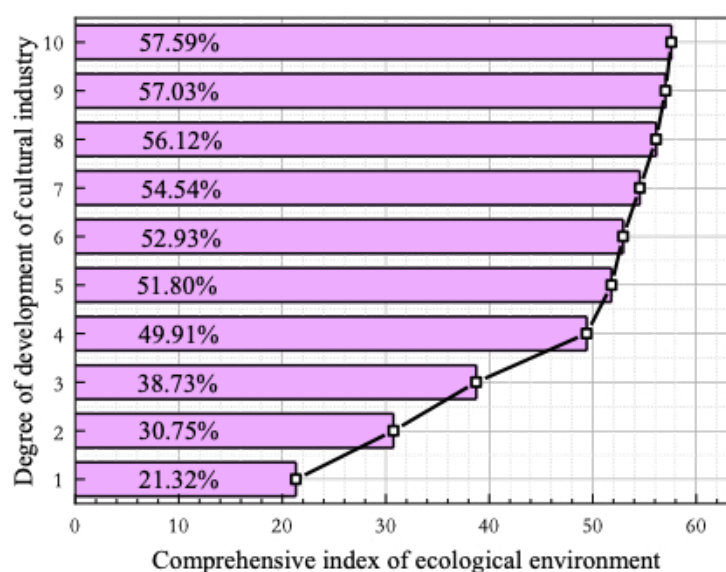


Figure 4. Changes in comprehensive indicators of the ecological environment with the degree of development of the cultural industry

5. CONCLUSION

The development and transformation of the ecological environment is an important element of global environmental change and an indicator of the future. At the same time, the common protection of the environment by all peoples is influenced by comprehensive factors such as localized industries and humanistic thoughts. By using the active promotion of the humanistic village culture industry and the active control of environmental ecology, we can further realize the coupled development under rural revitalization. In this paper, we study the coupling relationship between the development of village cultural industry and ecological environment changes and give comprehensive consideration to detecting regional ecological environment changes, optimizing cultural industry facilities, coordinating regional sustainable development and building regional ecological security patterns in the context of rural revitalization. The conclusions are as follows.

1. There is a complex dynamic coupling between the development of cultural industries and changes in the ecological environment. The cultural industry of villages is one of the important drivers of changes in the ecological environment, and the transformation of the cultural industry of villages leads to changes in the value of its services by changing the structure and function of the ecosystem. The study of the coupling relationship between the transformation of village cultural industries and ecological environment changes has considerable critical practical significance for detecting regional ecological environment changes, optimizing cultural industry facilities, coordinating regional sustainable development and building regional ecological security patterns in the context of rural revitalization.
2. The vegetation or forest cover in the surrounding areas increased by 9.2%, 17.4%, 28.1%, and 30.5% under the cultural industry protection levels of 2, 3, 4, and 5, respectively, compared to the cultural industry protection level of 1, with an average increase of about 10% with the cultural industry protection level. At the same time, the air pollution index decreased by 11.2%, 17.9%, 25.2% and 30.3% under the cultural industry protection level of 2, 3, 4 and 5, respectively, with an average reduction rate of about 8% with the cultural industry protection level. In addition, the pollution level of river water resources decreased by 4.1%, 6.6%, 8.9%, and 11.1% under the cultural industry protection level of 2, 3, 4, and 5, respectively, with an average reduction rate of about 3% with the cultural industry protection level.
3. Compared with the cultural industry development level of rank 1, the overall eco-environmental development index increased by 9.43%, 17.41%, 28.59%, 30.48%, 31.61%, 33.22%, 34.80%, 35.71%, and 36.27% for the cultural industry development levels of rank 2, 3, 4, 5, 6, 7, 8, 9, and 10, respectively. The improvement of the overall eco-environmental composite development index obtained a greater increase under the lower level of cultural industry development, with an average increase of about 9%. And when the degree of

cultural industry development reaches 4, the overall ecological environment comprehensive development index gradually slows down, which means that the cultural industry needs more to maintain a good ecological environment after taking shape, which is more conducive to sustainable development.

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